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ABSTRACT

The study attempted to measure the impact of diverse instructional methods on individuals whose learning styles tended to fall along a concrete-symbolic continuum as measured by a learning activities questionnaire. Two assumptions were made: (1) those with highly concrete learning styles learn best by direct contact type activities and (2) individuals with highly symbolic learning styles learn best by abstract type activities. The study population consisted of university students enrolled in an audiovisual communications class. Two methods of instruction were developed: a direct contact type using the actual equipment being studied with assistance from an instructor when desired, and an abstract method using audiotape narration only. Findings indicated that there was no significant difference in the cognitive skills gained regardless of learning style or treatment. However, there was a significant difference in psychomotor skills gained depending on the treatment method, with the direct contact method more effective than abstract treatments. It was felt, therefore, that the theory of learning style measurement and the teaching to measured learning style is a valid theory. Student opinion favored the direct contact type of instruction to the abstract approach. The questionnaire, testing and survey instruments, audiotape narrative, and data tables are appended. (Author/MF)

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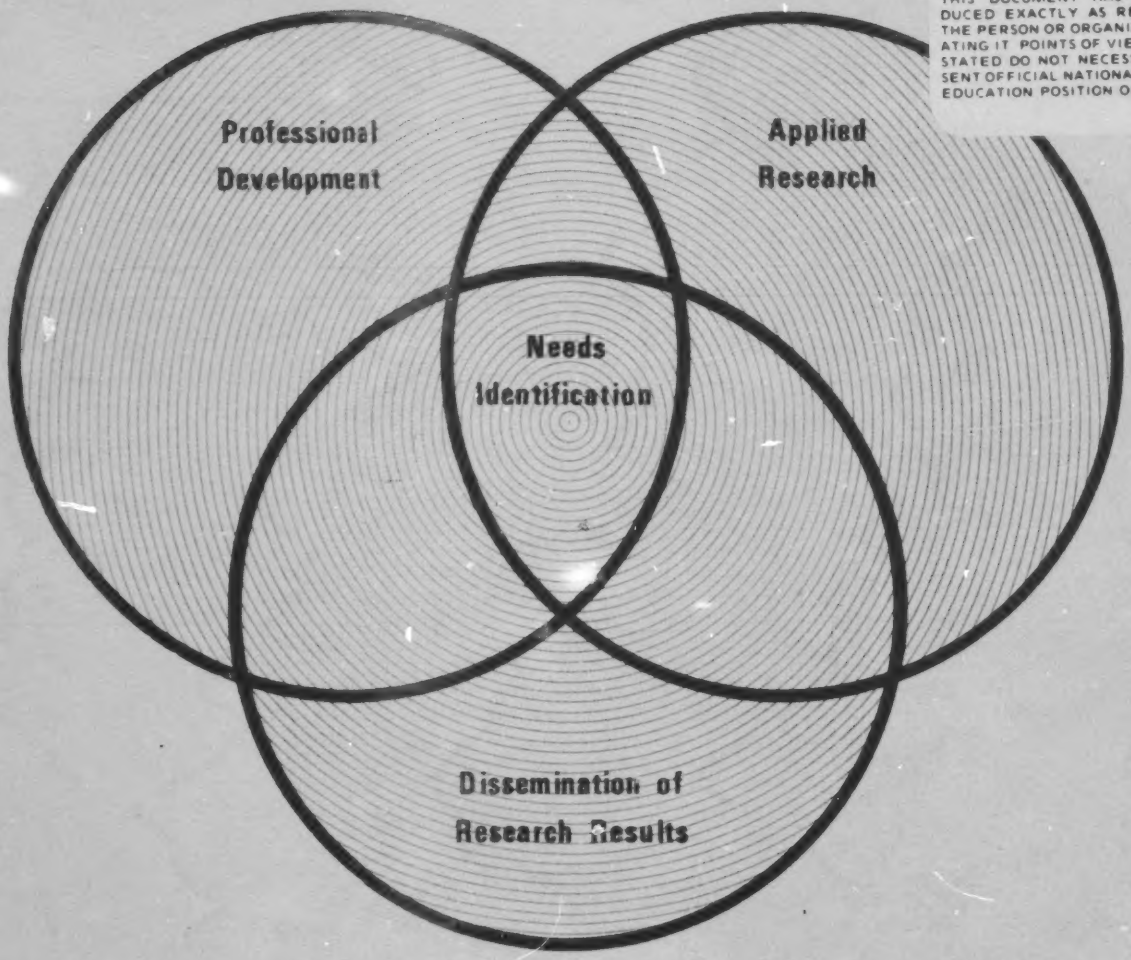

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Final Report

by

Jerry Ingram

A Research Paper
Submitted to Complete the
Plan B Requirements in
407-722
Problems in Audio-Visual Communications

(VT-102-140)

A STUDY OF THE CORRELATION BETWEEN SELECTED INSTRUCTIONAL METHODS AND INDIVIDUAL LEARNING STYLES MEASURED ON A CONCRETE/SYMBOLIC CONTINUUM

Final Report

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June, 1974

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J L I

CHAPTER I

INTRODUCTION

Learning styles, how to accurately measure learning styles and the problem of teaching to individual learning styles have been the objects of research in education for a number of years. Developing an instrument that will accurately measure those characteristics most essential to how each individual learns is difficult. Developing the instrument so that the instrument can efficiently and effectively be utilized by the classroom teacher is doubly difficult.

A study on an investigation of the interaction of learning styles and types of learning experiences in vocational-technical education was conducted in Wisconsin by John Banks in 1973.[1] Concrete and symbolic were identified as two learning styles relevant to vocational-technical education. An instrument was developed to effectively determine an individual's learning style. One conclusion of Banks' study was that if an individual's learning style could be determined then it was conceivable that alternative modes of instruction could be developed to provide the student an opportunity to learn material by a method that complimented his or her learning method.[2]

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[1] John C. Banks, "An Investigation of the Interaction of Learning Styles and Types of Learning Experiences in Vocational-Technical Education" (unpublished Educational Specialist thesis, The University of Wisconsin-Stout, Menomonie, 1973).

[2] Ibid., p. I-14.

Banks recommended that further evaluation with a control group of students be conducted to determine success within various courses offering divergent teaching styles. This study was primarily concerned with that recommendation.

Statement of the Problem

Theoretically, many learning styles have been identified, yet methods of instruction which compliment these learning styles have not been devised. The problem this study undertook was to measure the impact of diverse instructional methods on a control group whose learning styles tended to fall along a concrete-symbolic continuum.

Purpose of the Study

The purpose of the study was to answer two questions:

1. Do individuals with highly concrete learning styles learn best by direct contact type activities?
2. Do individuals with highly symbolic learning styles learn best by abstract activities?

More specifically, information was sought on a number of factors related to teaching methods and learning styles. Those factors were:

1. To determine which of two divergent teaching styles was best suited for a particular learning style.
2. To determine to what degree these divergent teaching styles affected learning in a control group.
3. To measure the reaction of the individuals in the group to the equipment used in terms of the equipment's viability as a teaching-learning instrument.
4. To measure student reaction to the teaching method used.
5. To identify other potentialities of the equipment used in relation to vocational-technical education.
6. To motivate vocational-technical educators to measure and utilize individual learning styles in preparing instructional goals and objectives and in teaching.

Hypotheses

To analyze each aspect of the general purpose of the study, a series of specific hypotheses was formulated as follows:

Ho_1: There is no significant difference between learning style groups in knowledge as measured by the scores on the Videorecorder/Videocamera Post Test.

Ho_2: There is no significant difference between treatment groups in knowledge as measured by the scores on the Videorecorder/Videocamera Post Test.

Ho_3: There is no significant interaction between treatment used and learning styles on knowledge gained as measured on the Videorecorder/Videocamera Post Test.

Ho_4: There is no significant gain in achievement of all groups as measured by pre-test and post test on knowledge of the videorecorder and videocamera.

Ho_5: There is no significant difference between the two learning style groups in psychomotor skills as measured by post test scores on a Videorecorder/Videocamera Equipment Use Test.

Ho_6: There is no significant difference between psychomotor skills gained and treatment used as measured by post test scores on a Videorecorder/Videocamera Equipment Use Test.

Ho_7: There is no significant interaction between treatment used and learning styles on psychomotor skills gained as measured on the post test of Videorecorder/Videocamera Equipment Use Test.

Method of Study

The procedures used in this study were designed to determine the impact of two divergent teaching methods on learning styles measured on a concrete-symbolic continuum.

An experimental study was conducted using a group of students enrolled at the University of Wisconsin-Stout. An instructional unit was developed having as an ultimate goal learner identification and understanding of the functions of the parts, and demonstrated learner performance of the operation of a portable television camera and videotape recorder. Two diverse methods of instruction were developed. One method was a direct contact type lesson. This method consisted of a self instruction booklet, the actual equipment being studied and tutorial assistance from an instructor whenever desired. The alternative method of instruction was abstract. An instructional narrative was recorded on an audiotape. In addition, the learner was given a set of four unlabeled line drawings. No other equipment, software or assistance was given.

Learning styles along the concrete-symbolic continuum were measured using the Learning Activities Questionnaire developed by Banks. (See Appendix A.) After individual learning styles were determined, the group was divided into two subgroups of individuals with equal numbers of people preferring the concrete learning style and symbolic learning style in each group. The entire group was pre-tested to determine each individual's understanding of the equipment to be used in the lesson. (See Appendix B.)

A short Characteristic and Equipment Use Survey was also given

each student. (See Appendix C.) The purpose of this survey was to obtain basic background information on the individual such as age, sex and grade level, and to find out how much knowledge the individual had concerning the equipment to be used in the experimental lesson.

During the experiment one group was instructed using the direct contact approach. The other group was instructed using the abstract method. Upon completion of the instruction an objective post test (same as the pre-test) and an equipment test were given. (See Appendix D.) The equipment test required the learner to demonstrate the ability to identify the parts of the equipment, the functions of the parts and to demonstrate his or her ability to operate the equipment. Upon completion of the experiment each student was asked to write his or her opinion of or reaction to any aspects of the experiment.

Scope and Limitations

The majority of studies in the field of educational learning have been conducted by teachers or other nonprofessionals in education. These studies have been characterized by inadequacies in conceptualization and rigor of research design and narrowly oriented toward improving particular skills or techniques of instruction rather than toward discovery of the principles affecting the improvement of classroom learning and instruction.

Rigorous research in learning theory has been undertaken by psychologists unconnected with education, investigating problems unrelated to the type of learning that goes on in the classroom.

For the past generation, the centrality of classroom learning

and cognitive development for the psychological aspects of education have been ignored in both theory and research.[3]

The above is mentioned to point out that the decline in knowledge and theorizing about classroom learning was a limiting factor in researching this problem.

The scope of the experiment was to evaluate success within a control group in an instructional unit offering divergent teaching methods. The only learner characteristic directly considered in this study was the learning style as measured by the scale developed by Banks. Other learner characteristics which must be considered in an actual classroom learning situation were not taken into account.

The Learning Activities Questionnaire utilized was developed to measure learning styles related to vocational-technical education. The continuums measured were concrete-symbolic and structured-unstructured. Only the concrete-symbolic continuum was used in this study. Furthermore, there are numerous learning style continuums in addition to those used in this study that would be considered in teaching an individual learner.

As yet no one has developed what is considered to be a truly reliable instrument to measure learning styles. It was felt that the instrument used in this study was sufficiently reliable for the purposes of this study.

All learners in this study were highly concrete in learning

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[3] Laurence Siegel (ed.), Instruction: Some Contemporary Viewpoints (San Francisco: Chandler Publishing Company, 1967), p. 208.

styles. It was assumed that this was due to the fact that a majority of the students enrolled at the University of Wisconsin-Stout are vocationally-technically oriented and thus highly concrete in learning styles.

Definition of Terms

The following terms are considered either unique to this study or generally restricted to a particular field of study. Definitions are provided to assist in reading and understanding the report.

Learning Style. A modification of behavior through interaction with one's environment by a particular characteristic mode of behavior.

Concrete Style. A preferred learning strategy employed by the individual where optimum learning is affected by that individual in a situation that allows the learner to become personally and actively involved with an object or in direct contact with phenomena in "hands on" experience.

Symbolic Style. A preferred learning strategy employed by the individual where optimum learning is affected by that individual in a situation that allows the learner to engage in a wide variety of mediated, computational, reading or verbal interaction to achieve learning.

Software. Instructional materials, both audio and visual, used for communication in instruction. In this category are phonograph records, recorded tapes, sound tracks from motion pictures, sound from television, motion picture films, transparent and printed photographs, transparencies and printed materials.

Review of Literature

In researching literature relating to learning theory the problem immediately arose that the dimensions of learning theory are so great that it was impossible to realistically review the entire field of study. Numerous volumes were found relating to various points of view of learning, such as Smith and Smith,[4] Hilgard,[5] and DeCecco.[6] It was also discovered that the semantics of learning theory were loosely defined.

An attempt was made to narrow the scope of research down to manageable proportions. In the narrowing process it was decided to direct emphasis to the concrete-symbolic continuum because of that continuum's proximity to vocational-technical education and to instructional technology.

Important to this study was not the identification of learning styles but the measurement of learning styles and the subsequent

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4 Karl U. Smith and Margaret Foltz Smith, Cybernetic Principles of Learning and Educational Design (New York: Holt, Rinehart and Winston, Inc., 1966).

5 Ernest R. Hilgard (ed.), Theories of Learning and Instruction (Chicago: National Society for the Study of Education, The University of Chicago Press, 1964).

6 John P. DeCecco, The Psychology of Learning and Instruction (Englewood Cliffs; New Jersey: Prentice-Hall, 1968).

teaching to these measured styles. The axiom was accepted that learning style measurement is sufficiently valid for the purposes of this study.

Research on the development of instruments that measure learning styles with validity was found minimal and unorganized. Most studies were concerned with identifying various learner characteristics and formulating particular styles of learning. How to measure learning styles and subsequently teach to the measured styles was not the prime target of the research.

In this chapter certain aspects of learner characteristics will be discussed with emphasis on concrete-symbolic styles.

Learning Style Research and Definition

There is an assumption that each individual has unique learner characteristics, learns differently and possesses "learning styles." This has been widely accepted. Attempts to measure these characteristics and to establish reliable learner styles have been less than successful. The problem with learning styles has been that no one has yet defined, at least clearly, what individual learning styles are.[7] In combining various dictionary definitions the following workable definition was assembled, a modification of behavior through interaction with one's environment by a particular characteristic mode of behavior.[8]

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[7] Jerrold E. Kemp, Instructional Design (Belmont, California: Fearon Publisher, 1971), p. 17.

[8] C. L. Barnhard (ed.), The American College Dictionary (New York: Random House, 1966), p. 694, p. 1203.

Banks' defined learning styles as patterns of behavior an individual uses to acquire knowledge, skills, and attitudes.[9]

Tallmadge, Shearer and Greenberg pointed out that characteristics an individual possesses that interact with instruction, sometimes enhancing learning and sometimes impeding instruction have popularly been called learning styles.[10]

There was an implication of learning styles in Bloom's reference to the development and stabilization of school learning patterns. Bloom defined these stable characteristics as characteristics consistent from one period to another and stated that if the effects of various factors on this stability could be determined, it might be possible to alter the pattern of academic achievement.[11]

Bruner hinted of the existence of learning styles when he implied that people with different characteristics react differently to varied instructional techniques.[12]

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9 John C. Banks, "An Investigation of the Interaction of Learning Styles and Types of Learning Experiences in Vocational-Technical Education" (unpublished Educational Specialist thesis, The University of Wisconsin-Stout, Menomonie, 1973), p. I-16.

10 G. Kasten Tallmadge, James W. Shearer and Anne M. Greenberg, Study of Training Equipment and Individual Differences: The Effects of Subject Matter Variables (Orlando, Florida: Naval Training Device Center, May, 1968), p. 15.

11 Benjamin S. Bloom, Stability and Change in Human Characteristics (New York: John Wiley and Sons, 1964), p. 2.

12 Jerome S. Bruner, Toward A Theory of Instruction (Cambridge: The Harvard University Press, 1966), p. 45.

Learning styles, as defined by DeCecco, are ways in which individuals process information in the course of developing new concepts and principles.[13] DeCecco further mentioned two types of learning styles, conceptual tempos and selection strategies. Conceptual tempos are the dispositions of a person to either reflect on a solution to a problem or to make an impulsive judgement. Selection strategies are ways in which individuals control the order in which examples or nonexamples of a concept appear. Four different selection strategies were identified by DeCecco: (1) conservative focusing, (2) focus gambling, (3) simultaneous scanning and (4) successive scanning. These learning styles as defined and discussed by DeCecco are one component of what he defined as "entering behavior." The other two behaviors were learning sets and learning abilities.[14]

Not all research supported the theory that in each individual there is a unique learning style. Citing a study done by Tallmadge and Shearer in 1967, Tallmadge stated that they found no evidence to support the existance of learning styles.[15] Throughout the research investigated however, the learning style theory was generally supported.

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[13] John P. DeCecco, op. cit., pp. 75-79.

[14] Ibid., p. 68.

[15] Tallmadge, Shearer and Greenberg, op. cit., p. 13.

Continuums of Learning Styles

The concrete-symbolic dimension of learning styles is but one of many theorized. Banks' Learning Activities Questionnaire measured learning styles not only on a continuum from concrete to symbolic but also from structured to unstructured. Other continuums found included analytic-global; reflective-impulsive; conjunctive-disjunctive; rigid inhibited, undisciplined, acceptance anxious, and creative; and cognitive interest styles related to vocational interests.

Witkin, Dyk, Faterson, Goodenough and Karp, in summarizing the analytical-global dimension perceive learning in terms of perceptual functioning. Contrasting analytical and global ways of perceiving, the analytical individual is able to overcome or seperate the influence of embedding contexts. The global perceiver, on the other hand, cannot adopt an analytical approach for effective performance and therefore uses a global approach of passively acceding to the influence of the surrounding field. These individuals lack the ability to perceive an item independently from the context in which it occurs.[16]

In discussing the dynamics of conceptual tempo, Kagan reports five phases of problem solving. Two of the five phases, selection of a hypothesis and evaluating the validity of a solution, influence the reflective-impulsivity dimensions. The individual who selects and reports solutions quickly with minimal consideration for their accuracy are impulsive. The reflective individual is the individual

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16 H. A. Witkin, R. B. Dyk, H. F. Faterson, D. R. Goodenough, and S. A. Karp, Psychological Differentiation (New York: John Wiley and Sons, 1962), p. 54.

who, of equal intelligence, takes more time to consider the validity of a solution. According to Kagan, the teacher should adjust his teaching methods to accomodate both styles.[17]

Archer identifies a single dimension based on disjunctive and conjunctive concepts. The conjuctive concept, the simplest case of a concept, would have but one alternative, the original thought or idea. As the number of alternatives becomes greater, the more disjunctive possibilities can be entertained.[18]

In identifying learning styles, Rosenberg identified related learner behavioral characteristics as well as these four styles:

1. Persons who follow a structured process of learning and control the impacts of internal and external data sources. These persons are labelled rigid inhibited.

2. Persons who rely heavily on their own feelings and knowledge and give little attention to other sources of data. These persons are identified as undisciplined.

3. Persons who depend mainly on external information and do not make extensive use of internal information. These persons are termed acceptive anxious.

4. Persons who effectively use internal and external data. These persons are identified as creative.[19]

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17 J. Kagan, "Reflection-Impulsivity: The Generality and Dynamics of Conceptual Tempo," Journal of Abnormal Psychology, LXXI (Feb., 1966), p. 17.

18 Herbert J. Klausmeier and Chester W. Harris (ed.), Analysis of Concept Learning (New York: Academic Press, 1966), p. 39.

19 Banks, op. cit., pp. I-7-8, citing M. B. Rosenberg, Diagnostic Teaching (Seattle: Special Child Publications, 1968), pp. 33-61.

Cognitive Interest Styles

Six cognitive interest styles of particular interest to vocational education were developed by Holland and alluded to by Johansson. The six cognitive styles are realistic, investigative, artistic, social, enterprising, and conventional. The realistic individual avoids abstract thought and reading, preferring agricultural, technical and skilled trades. This individual achieves well in activities relating to motor skills. The investigative person likes activities involving asocial, analytic, and imaginative behavior. The artistic person enjoys creative types of activities. The social person achieves in areas of leadership, culture, and scholarship, avoiding motor skill activities. The enterprising person avoids confining activities requiring persistence. The conventional person avoids aggressive outlets. He achieves in vocational occupations.[20]

The Concrete-Symbolic Continuum

As previously mentioned, concrete-symbolic learning styles because of their nature were of particular importance in this study. Both styles lend themselves well to vocational-technical education and to audiovisual approaches to teaching.

Dale and Bailand referred to the continuum as concrete and abstract and to learning styles as concepts. They explained the theory of conceptual development as movement from concrete to

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[20] Charles B. Johansson, "Cognitive Interest Styles of Students," Measurement and Evaluation in Guidance, IV (October, 1971), pp. 176-177.

abstract to concrete, a continuing interaction between the two.[21]

Symbolic communication was also described by Dale and Belland as three closely related media: reading and writing, speaking and listening, and visualizing and observing.[22] The explanation of the concrete-symbolic continuum given by these two appeared to be one of the better attempts. They suggested that experiences direct, hands-on to those which are removed from direct sense experiences and are highly symbolic.[23]

John Dewey, always concerned with communication, inferred a concrete-symbolic approach to communication when he contrasted immediate, direct experience in which we take part vitally and at first hand with experiences gained through the intervention of representative media.[24] Here the relationship of media to the concrete-symbolic continuum was emphasized.

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21 Edgar Dale and John Belland, A Guide to the Literature of Audiovisual Instruction (Stanford, California: ERIC Clearinghouse on Media and Technology, 1971), p. 2.

22 Ibid., p. 1.

23 Ibid., p. 2.

24 John Dewey, Democracy and Education (New York: The Free Press, 1944), p. 232.

The concrete-symbolic continuum appears well defined and the importance of instructional media to the learning styles lying along the range substantiated. Conversely, measurement of learning styles is in its infancy. Until such time as a workable definition for learning styles is developed it appears unlikely any consistently reliable measurement device will be developed. At present time there are too many unsolved problems. Instructional theory, growth in learning and the identification of individual differences, the behavorial sciences, are not fully understood. Research and semantics are not formalized. Assessment in this area is just beginning. It may be necessary to devise completely new techniques of measurement.

Summary

Resume of Problem and Purpose

Theoretically many learner styles have been identified. There was a need to develop methods of instruction which compliment these measured learning styles. The problem this study undertook was to measure the impact of diverse methods of instruction on a group of individuals whose learning styles fell along a concrete/symbolic continuum as measured by a Learning Activities Questionnaire.

Two assumptions were basic to the study:

1. Individuals with highly concrete learning styles learn best by direct contact type activities.

2. Individuals with highly symbolic learning styles learn best by abstract type activities.

These two assumptions were reduced to a series of seven hypotheses as follows:

Ho_1: There is no significant difference between learning style groups in knowledge as measured by the scores on the Videorecorder/Videocamera Post Test.

Ho_2: There is no significant difference between treatment groups in knowledge as measured by the scores on the Videorecorder/Videocamera Post Test.

Ho_3: There is no significant interaction between treatment used and learning styles on knowledge gained as measured on the Videorecorder/Videocamera Post Test.

Ho_4: There is no significant gain in achievement of all groups as measured by pre-test and post test on knowledge of the videorecorder and videocamera.

Ho_5: There is no significant difference between the two learning style groups in psychomotor skills as measured by post test scores on a Videorecorder/Videocamera Equipment Use Test.

Ho_6: There is no significant difference between psychomotor skills gained and treatment used as measured by post test scores on Videorecorder/Videocamera Equipment Use Test.

Ho_7: There is no significant interaction between treatment used and learning styles on psychomotor skills gained as measured on the post test scores on the Videorecorder/Videocamera Equipment Use Test.

Method of Study

An experimental study was conducted. A Learning Activities Questionnaire was used to measure the learning styles of the group along a concrete/symbolic continuum. After the learning style of each group member had been determined, the main group was divided into two subgroups with equal numbers of people preferring the concrete learning style and symbolic learning style in each group.

Two diverse methods of instruction were developed, one method was a direct contact method, allowing "hands-on" type activities. The alternate method was an abstract approach utilizing only an audiotape narrative and several line drawings.

The group was pre-tested with an objective test to determine knowledge of instructional subject. A characteristics and equipment use survey was also conducted.

During the actual experiment, the individuals in each group were instructed by either the direct contact method (Treatment I) or the abstract method (Treatment II). The method of instruction used was determined by the group the person was in. After the instruction had been completed, each person was given an objective post test to determine cognitive gains and an equipment test to determine if appropriate psychomotor skills had been acquired.

A weighted score analysis was conducted on the pre and post tests for the purpose of determining cognitive knowledge gained. A two way analysis of variance was run on the two groups to test hypotheses as they related to the basic assumptions of the study. A t-test of differences (t_d) was conducted to measure gain of knowledge between pre and post tests.

CHAPTER II

METHOD OF STUDY

When attempting to measure how an individual learns, many learner characteristics must be considered. In addition to an instrument that will reliably measure learning styles along a continuum, such variables as interest, personality, and subject matter must also be considered. Because of the nature of this study it was determined that such in-depth measurements of the population as interest and personality inventories were not feasible. Instead it was decided that the Learning Activities Questionnaire developed by Banks was sufficiently valid for the purposes of this study.

Development of the Learning Activities Questionnaire

In 1973 John Banks developed a Learning Activities Questionnaire designed to measure concrete, symbolic, structured and unstructured learning styles relevant to vocational and technical educational programs. What follows is a resume of how Banks developed the scale.

The fact that the Learning Activities Questionnaire developed by Banks is relevant to vocational and technical education programs was an important consideration in the study because the control group to be used in the study was a group of students enrolled in a technically oriented institution. The instrument was designed so that a continuum from highly concrete to highly symbolic was formed. Statements on the questionnaire were designed to reflect various positions between the continuum ends.

In addition to the final instrument developed, a semantic differential was developed with a similar format. A pilot administration was conducted to measure the effectiveness of both instruments. Based on the pilot administration, the semantic differential scale was discontinued and the Learning Activities Questionnaire was revised to improve reliability and incorporate participant's suggestions.[1]

The final administration of the Learning Activities Questionnaire was conducted at Fox Valley Technical Institute, Appleton, Wisconsin. Groups selected for the final administration were selected on the basis of assumed learning styles evident in various vocational programs.[2]

Upon completion of his study, it was felt by Banks and his advisor that the instrument was measuring the concrete-symbolic continuum and that the final instrument could effectively measure an individual's learning style based on the variables investigated in the study.[3]

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1 John C. Banks, "An Investigation of the Interaction of Learning Styles and Types of Learning Experiences in Vocational-Technical Education" (unpublished Educational Specialist thesis , The University of Wisconsin-Stout, Menomonie, 1973), p. II-5.

2 Ibid., p. II-8.

3 Ibid., p. I-2.

Selection of the Population

Assumed learning styles are widely used in individualized instruction. Individual instructional packages have been developed to be used with specifically identified learner characteristics. While it is not possible to provide individualization for every learner, it is possible to match groups of learners by common attributes. It was decided to select a group of students presumed to have the same basic characteristics and interests and to utilize an individualized technique as the mode of instruction.

The population chosen for this experiment consisted of students enrolled in an Audio Visual Communications class at the University of Wisconsin-Stout. This is a course offered to both undergraduate and graduate students and is not required in any degree program at the school. The group chosen was selected because: (1) it was felt the group would exhibit a wide range of learning styles along the desired continuum, (2) the class was ready to start a unit in instructional television and (3) the instructor's willingness to allow the experiment to be administered to the class.

The students enrolled in the class were not required to participate in the experiment. As an incentive the class was allowed to take one class period off and in place of regular class attendance they could participate in the experiment. Participation by the group was encouraging. Forty-one students took the Learning Activities Questionnaire and twenty-six participated in the experiment. Participation was good considering the fact that the experiment was conducted during the last weeks of the spring semester.

Characteristics of the Test Group

The Characteristic and Equipment Use Survey administered to the group revealed no graduate students participated in the experiment. Statistically this eliminated those students at the master degree level enrolled in the Audio-Visual Communications degree program and considered highly audio visually oriented.

One interesting aspect of the characteristics survey was that eighteen of the twenty-six participants were female. This was understandable when the same survey revealed nineteen of the participants were enrolled in some phase of the Home Economics program and that only three students were enrolled in Industry and Technology.

Learning Styles of the Test Group

A wide range of learning styles along the concrete-symbolic continuum was not exhibited in the group. Instead the group proved to be highly concrete in learning styles. This was not totally unexpected as it was assumed most students enrolled at the University of Wisconsin-Stout would tend to have concrete learning styles. However, it was hoped that as the group was randomly selected, the spread along the continuum would be greater.

Previous Equipment Experience of the Test Group

Twenty-three of the participants had used neither a videotape recorder nor a videocamera. Twenty-one had not used a single lens reflex camera. Use of the single lens reflex camera was considered an important factor because of the similarity of the lenses on the videocamera to those used on a single lens reflex camera.

Approximately 77 per cent of the participants had used an audiotape recorder of some type, which is understandable because of the wide use of cassette tape recorders today. This variable was considered of minor significance even though there is a similarity in the basic operation of the videorecorder and audiotape recorders.

The overall results of the Characteristic and Equipment Use Survey revealed that very few of the participants were audio visually oriented and even fewer had any familiarization with videotape recorders or videocameras. These facts tended to strengthen the assumption that positive learning took place during the experiment, as revealed by the post tests.

The Subject of Instruction

The subject to be taught should be one that is well suited to a population with a range of learning styles ranging from concrete to symbolic. The portable television system appeared to be a unit of equipment that fulfilled this requirement.

The component parts of the portable television system, the videorecorder and the videocamera were considered relatively complex pieces of equipment to operate, yet operation of the equipment is not unusually difficult. Although the system has been widely used in schools not many students have had an opportunity to operate the equipment.

The researcher's knowledge of the capabilities and operation of the equipment was used in determining what types of instructional packages could be developed on the utilization of the equipment.

Cognitive and psychomotor skills were considered in writing objectives for the packages and the portable television system appeared to offer an opportunity for the learners to acquire and use both of these types of skills.

Measuring Learning Styles

Administration of the Learning Activities Questionnaire

The instructor and the researcher met prior to the administration of the Learning Activities Questionnaire to discuss the procedure to be followed for pre-testing. It was decided that the questionnaire would be administered by the instructor at the end of a regular class period. The questionnaire was short and required little time to administer. On the day of administration the instructor informed the class of the purpose of the Learning Activities Questionnaire.

Results of the Learning Activities Questionnaire

Upon completion of the administration of the Learning Activities Questionnaire, a weighted score analysis was run on the test results. This provided test scores and a frequency distribution needed for subsequent group distribution. As previously stated, the results with respect to the range of learning styles along the continuum were disappointing. The raw score range was a low of 32 to a high of 46 with 38.3 as the mean. (See Table I.)

As designed by Banks, the range limits of the continuum were 11 to 55 with 33 determined to be the mid-point. The closer the raw score to 11 the more symbolic the individual appeared to be. The closer the score to 55 the more concrete the learner appeared

to be. An average mix or assortment could be achieved by those individuals whose responses revealed a raw score of 33.[4] The lower limit of the population researched was 32, one point below the average of the continuum the questionnaire was designed to measure. Thus, as measured by the Learning Activities Questionnaire, the group was highly concrete in learning styles.

TABLE I

FREQUENCY DISTRIBUTION OF TEST SCORES ON THE LEARNING ACTIVITIES QUESTIONNAIRE

Score	Frequency
46	1 *
45	0
44	2 * *
43	1 *
42	3 * * *
41	3 * * *
40	7 * * * * * * *
39	4 * * * *
38	5 * * * * *
37	4 * * * *
36	2 * *
35	4 * * * *
34	2 * *
33	2 * *
32	2 * *

[4] Ibid., p. II-3.

Assignment to Treatment Group

After an analysis of the Learning Activities Questionnaire results it was decided that those students with raw scores ranging from 39 to 46 would be classified Learner Type I, concrete, and those students with raw scores ranging from 32 to 38 Learner Type II, symbolic. The population was then divided into two subgroups. Each subgroup had as nearly an equal number of students with concrete and symbolic learning styles as was possible. Initially there were fifteen students in Subgroup A and sixteen students in Subgroup B.

The students in one group were to be instructed by the direct contact method. This method was designated Treatment I. The students in the other group were to be instructed by the abstract approach. This method was designated Treatment II. Upon completion of the experiment a correlation between the matched and mismatched groups was to be made.

Pre-Test Administration

One week prior to the actual experiment the pre-test was given. The purpose of the study and the reason for the pre-test were reviewed with the entire group. It was pointed out that the pre-test was not a measurement of the abilities of the individuals in the group nor was a grade to be given and that the pre-test and participation in the experiment in no way affected final course grades.

During the pre-testing period a sign-up sheet was passed around the class. Those willing to participate in the experiment were asked

to sign up for a one hour block of time during any one of five days the following week. Participants were advised of the location of the building and room the experiment was to be conducted in. At this time the entire class was advised that they need not attend regular class during a specified day the following week.

Administration of the Experiment

The experiment was arranged so that it could be administered to as many as four people at once. Three videotape stations and three audiotape stations were set up. Two graduate assistants and the researcher were available to assist in the experiment.

As each participant arrived for the experiment the participant was advised on how the experiment would be conducted. It was pointed out to each participant that the post test results were not a reflection of his or her ability but more a reflection of the instructional method used.

The participants were then given a list of instructional objectives and precautions. Depending on the subgroup the participant was in, either a self instruction booklet, Treatment I, or an audiocassette and set of line drawings, Treatment II, was given to each student.

Treatment I Instructional Method

The method of instruction used for the direct contact group, Treatment I, consisted of a self instruction booklet, an actual videorecorder and videocamera to look at and to manipulate as desired, and the assistance of a tutor whenever necessary. By using this

approach very little learning would be left to chance. What the learner could not understand by referring to the self instruction booklet or by manipulating the equipment could be explained to the learner by the tutor.

The self instruction booklet consisted of various photographs of the equipment, including extreme close-up shots of those areas where it was felt necessary to emphasize a point, and a descriptive narrative explaining either the location of a part, the function of a part, or how to manipulate a certain part. The photographs and narratives were drymounted on poster board and placed in a loose-leaf notebook.

Treatment II Instructional Method

An audiotape narrative (See Appendix E.) was recorded on a cassette tape. The learners in the group designated Treatment II were given the cassette tape, a playback unit, earphones and a set of four line drawings. The line drawings were intentionally abstract with no descriptive information supplied. Instruction to this group consisted of listening to the audiotape and referring to the line drawings. No other instruction or assistance was given.

Post Test Administration

When a participant was ready, the post test was administered. No time limit was set on the participants. Most took approximately forty-five minutes to complete the entire experiment. The post test consisted of an objective test exactly the same as the pre-test and an equipment test. In taking the equipment test the learner was

required to identify parts of the equipment, demonstrate his ability to operate the equipment and record a short sequence on videotape that was played back at the completion of the test. The instructions for completing the equipment test were the same for each student. An instructional narrative to follow was given each aide. (See Appendix D.)

Upon completion of the equipment test each participant was asked to complete the Characteristic and Equipment Use Survey and to list on a seperate sheet of paper any comments, recommendations or suggestions concerning any phase of the experiment.

CHAPTER III

RESULTS

Upon completion of the experiment a statistical analysis of the data was necessary in order to interpret the results of the study. A number of different computations were necessary. The results of the data, the analysis and the interpretations follow.

Division of Population

The population was divided into two main groups according to learning styles based on raw scores as measured by the Learning Activities Questionnaire. As designed by Banks, the range limits of the continuum were 11 to 55 with 33 determined to be the mid-point. The closer the raw score to 11 the more symbolic the individual appeared to be. The closer the score to 55 the more concrete the learner appeared to be.

Equating the Two Groups on Learning Styles

The raw score range on the population group tested for this experiment was a low of 32 to a high of 46 with 38.3 as the mean. As shown in Table II, the raw scores of Group I ranged from 39 to 44. The raw scores of Group II ranged from 33 to 38. The total raw scores for each group vary somewhat. The larger total raw score for Group I indicates that this group is somewhat more concrete in learning styles than Group II. The lower total raw score for Group II indicates they were more symbolic in learning styles.

TABLE II

COMPARISON OF RAW SCORES FOR LEARNING ACTIVITIES QUESTIONNAIRE

Group I Treatment I	Group I Treatment II	Group II Treatment I	Group II Treatment II
42	40	38	38
40	44	36	38
44	40	37	33
39	40	35	34
39	41	38	35
43	42	35	36
Total 247	247	219	214
Group Total 494		433	

To further verify the differences in learning styles between Group I and Group II, an analysis of the means and standard deviations of the raw scores of the Learning Activities Questionnaire was conducted. These means and standard deviations are listed in Table III.

A visual inspection of the means and standard deviations of the two groups and their subgroups indicated that there was a difference between the two groups in learning styles.

To test whether this was a significant difference, a t-test was carried out on the groups. The data presented in Table IV show the value of t for the difference between the two groups in learning

style as measured on the Learning Activities Questionnaire.

TABLE III

COMPARISON OF THE MEANS AND STANDARD DEVIATIONS
FOR THE RAW SCORES OF THE
LEARNING ACTIVITIES QUESTIONNAIRE

Group	Mean	Standard Deviations
Group I Treatment I	41.16	2.14
Group I Treatment II	41.16	1.60
Total Group	41.16	1.80
Group II Treatment I	36.50	1.39
Group II Treatment II	35.67	2.06
Total Group	36.09	1.73

The value for t was significant at the .01 level. From this it can be concluded that there is a significant difference in learning styles between the two groups.

TABLE IV

ANALYSIS OF THE t-TEST ON LEARNING STYLES

Group	Means	t
Group I	41.16	
Group II	36.09	
Mean Difference	5.07	4.98*

*significant at .01 level.

Equating the Two Groups on Knowledge

To insure that the results of an experiment are valid, the two groups used in the experiment must be equal in all respects except for the variables being tested. For this experiment, the two groups must be equal in subject knowledge and previous use of the videorecorder and videocamera.

To determine if the two groups and subgroups within each group were similar in subject knowledge a Videorecorder/Videocamera Pre-Test was used. The data in Table V present the means and standard deviations of the composite scores for the two groups. Individual scores for each student in Group I may be found in Appendix F and individual scores for each student in Group II in Appendix G.

TABLE V

COMPARISON OF THE MEANS AND STANDARD DEVIATIONS FOR THE COMPOSITE SCORES OF VIDEORECORDER/VIDEOCAMERA PRE-TEST

Group	Mean	Standard Deviations
Group I Treatment I	10.500	2.029
Group I Treatment II	10.000	2.805
Total Group	10.250	5.720
Group II Treatment I	11.667	1.563
Group II Treatment II	7.500	1.821
Total Group	9.584	4.520

The maximum score possible on the pre-test was 27. A visual inspection of the group and subgroup means indicated that the overall

performance level of the group was low. The range of scores was from a low of 1 to a high of 18.

A further inspection of the means and standard deviations indicated that the two groups including their subgroups were approximately equal in their pre-test knowledge. To verify this, a statistical analysis of the two groups was carried out through the use of the two way analysis of variance (F Statistic).

If the F value was not significant, there was no significant difference in knowledge between the two groups and the two groups could be considered equal in pre-test knowledge. The data in Table VI present the results of the comparison of the two groups on knowledge.

TABLE VI

ANALYSIS OF VARIANCE ON THE COMPOSITE SCORES OF VIDEORECORDER/VIDEOCAMERA PRE-TEST

Component	Sum of Squares	Degrees of Freedom	Mean Squares	F
Treatment	2.6668	1	2.6668	0.10
Learning Style	32.6667	1	32.6667	1.23
Interaction	20.1665	1	20.1665	0.76
Error	532.3330	20	26.6167	
Total	587.8330	23		

The F value for learning styles was not significant at the .05 level indicating the two groups were similar in pre-test knowledge.

Equating the Two Groups on Previous Equipment Use

To further analyze the experiment group a comparison of responses on previous use of selected equipment was conducted. As shown in Table VII the only piece of equipment that had even moderate use by either group was the audiotape recorder. This moderate use was considered of minor significance even though there is a similarity in the basic operation of the videorecorder and audiotape recorders.

All other equipment included in the survey had for the most part been used not at all by either group. Therefore, the two groups can be considered equal in terms of previous equipment use.

TABLE VII

COMPARISON OF RESPONSES ON PREVIOUS EQUIPMENT USE SURVEY

Equipment	Not At All		Occasional Use		Moderate Use		Frequent Use		Extensive Use	
Group	I	II	I	II	I	II	I	II	I	II
Audiotape Recorder	3	3	2	1	4	5	0	1	3	2
Videotape Recorder	10	11	1	1	1	0	0	0	0	0
Single Lens Reflex Camera	10	10	1	0	0	1	1	1	0	0
Videocamera	10	11	1	1	1	0	0	0	0	0

It was concluded at this point that Group I and Group II were equal in all respects except learning styles and that Group I exhibited a concrete learning style and Group II a more symbolic learning style.

Post Experiment Analysis of Cognitive Skills

Post Comparison of Knowledge of the Two Groups

The purpose of the post test on knowledge of the videorecorder/videocamera was to ascertain whether any differences existed between the two groups and subgroups and to determine whether the gains between the pre-test and post test were significant within each group.

The first hypothesis was:

Ho_1: There is no significant difference between learning style groups in knowledge as measured by the scores on the Videorecorder/Videocamera Post Test.

To test this, an analysis of the means and standard deviations of the two groups and subgroups was conducted. The means and standard deviations of the two groups as well as subgroups within each group on the Videorecorder/Videocamera Post Test are presented in Table VIII. Individual scores on the post test for the two groups may be found in Appendix F and G respectively.

The maximum score possible on the Videorecorder/Videocamera Post Test was 27. The overall performance of the groups on this test as shown by the group means was high. The low score on the test was 12 and the high score was 26.

A visual analysis of the means and standard deviations of the two groups indicated that the two groups and subgroups were nearly equal.

To verify this a statistical analysis was carried out through the use of the two way analysis of variance (F Statistic). If the first hypothesis was accepted it would be concluded that there was no significant difference between the two learning style groups in achievement. Results of the analysis of the two groups are presented in Table IX.

TABLE VIII

COMPARISON OF THE MEANS AND STANDARD DEVIATIONS FOR THE VIDEORECORDER/VIDEOCAMERA POST TEST

Group	Mean	Standard Deviations
Group I Treatment I	21.500	0.806
Group I Treatment II	20.500	1.996
Total Group	21.000	3.593
Group II Treatment I	22.500	0.428
Group II Treatment II	21.333	1.358
Total Group	21.916	2.430

The F value for learning style (0.70) was not significant at the .05 level indicating the two groups were similar and the first hypothesis was accepted.

Treatment Effects

The second hypothesis concerned the relationship of treatment used and knowledge gained:

Ho_2: There is no significant difference among treatment groups in knowledge as measured by scores on the Videorecorder/ Videocamera Post Test.

TABLE IX

ANALYSIS OF VARIANCE ON VIDEORECORDER/
VIDEOCAMERA POST TEST

Component	Sum of Squares	Degrees of Freedom	Mean Squares	F
Treatment	5.0420	1	5.0420	0.50
Learning Style	7.0420	1	7.0420	0.70
Interaction	0.0410	1	0.0410	0.00
Error	199.8330	20	9.9917	
Total	211.9580	23		

To test the hypothesis a statistical analysis was carried out through the use of the two way analysis of variance (F Statistic). The difference in performance between the treatment groups is presented in Table IX. The value of F for treatment (0.50) was not significant at the .05 level, thus the second hypothesis was accepted.

Interaction of Treatment Used and Learning Styles

The third hypothesis involved the interaction between learning styles and treatment used. The hypothesis tested was:

Ho_3: There is no significant interaction between treatment used and learning styles on knowledge gained as measured on the Videorecorder/Videocamera Post Test.

To test the hypothesis a statistical analysis was carried out

with the two way analysis of variance (F Statistic). The value of F for interaction (0.00) found in Table IX was not significant at the .05 level indicating that there was no significant interaction and the third hypothesis was accepted.

Subject Knowledge Gain From Pre-Test to Post Test

The fourth hypothesis dealt with gain in subject knowledge. The hypothesis tested was:

Ho_4: There is no significant gain in achievement as measured by pre-test and post test on knowledge of the videorecorder and videocamera.

To determine if the gains in achievement between the pre-test and post test for the videorecorder and videocamera within each group were significant, a t-test of difference (t_d) was carried out on each treatment group. The data presented in Table X show the values of t_d for the differences between pre-test and post test within each treatment group.

TABLE X

ANALYSIS OF THE t-TEST OF DIFFERENCES IN GAIN FOR SUBJECT KNOWLEDGE

Group	Mean Difference	t_d
Group I Treatment I	11.000	5.0367*
Group I Treatment II	10.500	3.0496*
Group II Treatment I	10.833	6.7035*
Group II Treatment II	13.833	6.0911*

* significant at the .01 level.

All four t_d values exceeded the critical value of t at the .01 level, consequently all treatment groups had significant gains in subject knowledge of the videorecorder and videocamera and the fourth hypothesis was rejected.

A graphic description of the gains in knowledge is presented in Figure 1. A visual analysis of this figure tends to show that Group I Treatment II did not make as great a gain in knowledge as the other three groups.

Post Experiment Analysis of Psychomotor Skills

Post Analysis of Psychomotor Skills Gained

The purpose of the post test on the use of the equipment was to discover whether any differences existed between the two groups and the subgroups. The fifth hypothesis tested was:

Ho_5: There is no significant difference between the two learning style groups in psychomotor skills as measured by post test scores on a Videorecorder/Videocamera Equipment Use Test.

To test this hypothesis the means and standard deviations of the two groups and subgroups were analyzed. The means and standard deviations of the two groups including subgroups within each group are presented in Table XI. Individual scores on the equipment test for the two groups may be located in Appendix F and G respectively.

The maximum score possible on the equipment post test was 26. An analysis of the means of the groups and subgroups shows that there was a high level of performance. The low score on the test was 8 and

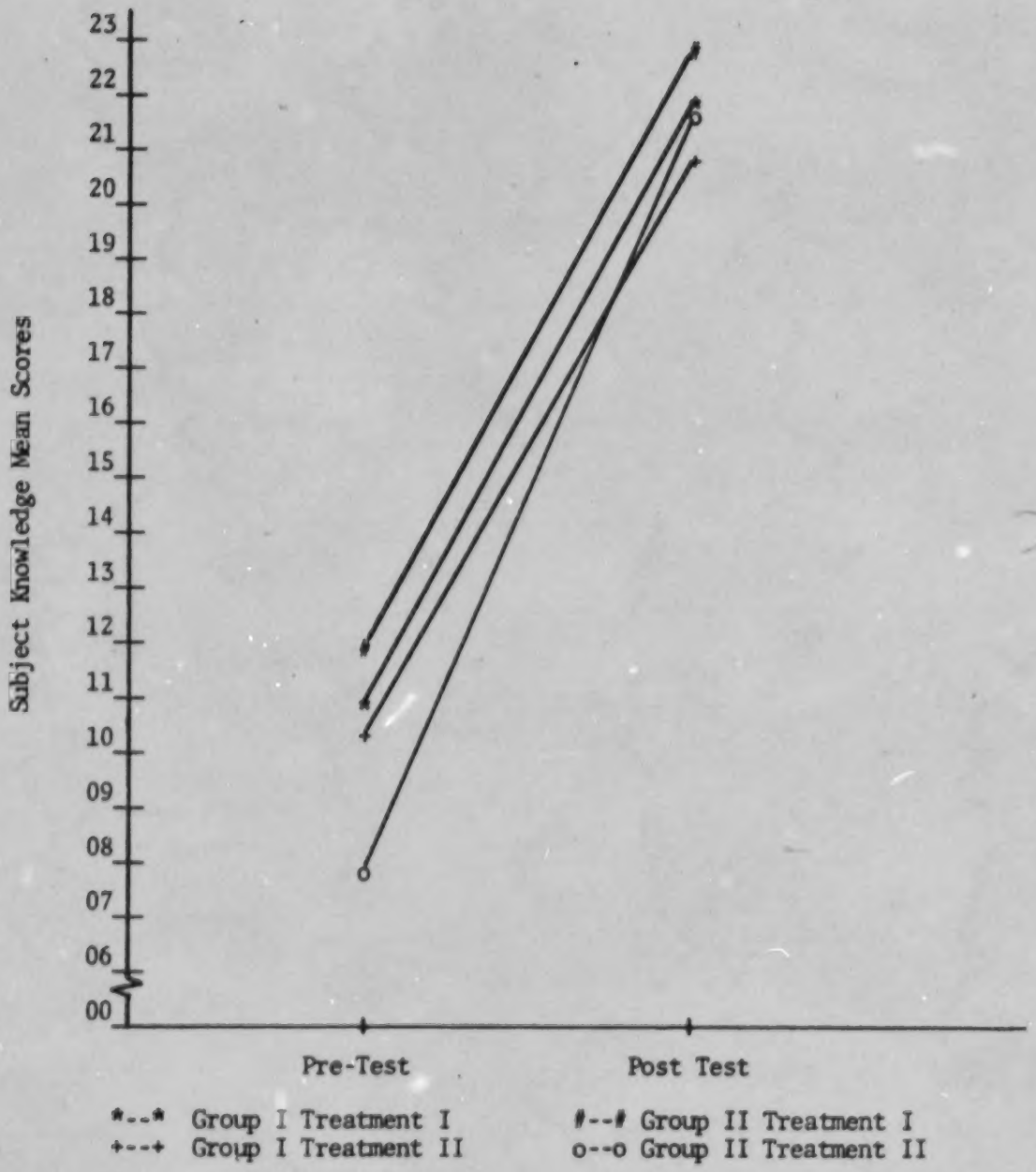

FIGURE 1

MEAN SCORES ON SUBJECT KNOWLEDGE PRE-TESTS AND POST TESTS OF GROUP I AND GROUP II

the high score was 26.

TABLE XI

COMPARISON OF MEANS AND STANDARD DEVIATIONS
FOR THE EQUIPMENT POST TEST

Group	Mean	Standard Deviation
Group I Treatment I	23.500	0.992
Group I Treatment II	20.500	1.911
Total Group	22.000	2.741
Group II Treatment I	24.500	0.428
Group II Treatment II	19.833	2.414
Total Group	22.167	4.727

A visual interpretation of the means and standard deviations indicated that the subgroups were somewhat dissimilar, but the total groups were similar. To verify this a statistical analysis was carried out with the use of the two way analysis of variance (F Statistic). The data presented in Table XII show the relationship of the two groups on the basis of psychomotor skills as measured on the equipment test.

The value of F for learning styles (0.01) was not significant at the .05 level indicating the two learning style groups were similar in psychomotor skills gained and the fifth hypothesis was accepted. Thus, there was no significant difference between the two learning style groups in the psychomotor skills gained.

TABLE XII

ANALYSIS OF VARIANCE ON THE POST TEST SCORES OF THE VIDEORECORDER/VIDEOCAMERA EQUIPMENT TEST

Component	Sum of Squares	Degrees of Freedom	Mean Squares	F
Treatment	88.1670	1	88.1670	5.52*
Learning Style	0.1670	1	0.1670	0.01
Interaction	4.1660	1	4.1660	0.26
Error	319.3330	20	15.9667	
Total	411.8330	23		

* significant at .05 level.

Treatment Effects

The sixth hypothesis concerned the relationship between psychomotor skills gained and the treatment used for the group:

Ho_6: There is no significant relationship between psychomotor skills gained and treatment used as measured by post test scores on the Videorecorder/Videocamera Equipment Use Test.

To test the hypothesis a statistical analysis was carried out through the use of the two way analysis of variance (F Statistic). The relationship of psychomotor skills and treatment used is presented in Table XII. The value of F for treatment (5.52) was significant at the .05 level, thus the sixth hypothesis was rejected. This showed that there was a difference in psychomotor skills gained depending on

the treatment used.

Interaction of Treatment and Learning Styles

The seventh hypothesis dealt with the interaction between treatment used and learning styles. The hypothesis tested was:

Ho_7: There is no significant interaction between treatment and learning styles on psychomotor skills gained as measured on the post test scores of the Videorecorder/ Videocamera Equipment Use Test.

To test the hypothesis a statistical analysis was carried out with the two way analysis of variance (F Statistic). The value of F for interaction (0.26), found in Table XII, was not significant at the .05 level indicating that there was no significant interaction and the seventh hypothesis was accepted.

Reactions to the Experiment

Student Reaction

Although both cognitive and psychomotor skills were included in the experiment, it was still deemed advisable to investigate student reactions to the treatment methods used to see if any significant differences could be noted.

Student comments on the treatments used in the experiment were placed on a continuum from 1 to 7 with 1 being extremely negative reaction and 7 being extremely positive reaction with 4 being a neutral reaction. A comparison of the student reactions is shown in Table XIII.

TABLE XIII

COMPARISON OF STUDENT REACTIONS TO TREATMENTS USED IN EXPERIMENT

	Reaction Scale						
	1	2	3	4	5	6	7
Treatment I	0	2	0	6	0	2	2
Treatment II	0	4	6	2	0	0	0

From a visual analysis of the student reactions it was evident that 83 per cent of the students had a neutral to positive reaction to Treatment I. However, when it came to Treatment II, the reverse was true with 83 per cent of the students having a negative reaction. To verify this pattern of reaction a Chi-Square Test was computed based on the information presented in Table XIII. The Chi-Square value arrived at was 11.333 which is significant at the .05 level. Therefore it could be concluded that students react more favorably to Treatment I and thus would be more receptive to knowledge and skills presented in this way.

Observed Reactions

In general it was observed that those students who used Treatment I found the method pleasant. The students seemed relaxed and were able to learn at their own speed without feeling any pressure. All Treatment I students seemed to find the material easy to grasp and could immediately apply the theories discussed to the actual operation

of the equipment.

In contrast, the students involved in Treatment II seemed frustrated by the whole learning experience. They found it difficult to concentrate on the material since they could not relate it directly to a detailed picture or the actual equipment. All Treatment II students seemed to find the material difficult and exhibited marked difficulty in relating the theories on the taped presentation to the actual operation of the equipment.

Summary

The two groups were very similar in their subject knowledge and their ability to use the equipment at the beginning of the experiment as shown by the two way analysis of variance and the comparison of responses on the Equipment Use Survey. There were no significant differences between the two groups on these variables. The only differences between the two groups was in their learning styles as shown in the raw score comparisons, the means and standard deviations of the groups and subgroups and the t-test.

After the experiment was completed, the two groups were still very similar in subject knowledge as shown by the two way analysis of variance. Both groups however had made significant gains in subject knowledge as verified by the t-test of differences (t_d). After the experiment there were significant differences in the psychomotor skills gained by the two treatment groups as verified by the two way analysis of variance.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

Findings

The two groups were equated in terms of previous knowledge and previous use of the videorecorder and videocamera. This equality was tested with a two way analysis of variance (F Statistic) and a comparison of survey results. Learning style variance was tested with a t-test and the groups were found to be significantly different. Thus, the two groups were not considered to be significantly different, except in terms of learning styles.

To ascertain the effects of the experiment, three hypotheses were tested concerning the comparison of the two groups on cognitive skills as far as knowledge gained and interaction between treatment used and learning styles. The hypotheses were tested with the two way analysis of variance (F Statistic). In each case the hypotheses were accepted indicating that there were no significant differences between the groups in subject knowledge gained.

A t-test of difference (t_d) was used to determine if the two groups had significant gains in subject knowledge. Both groups realized significant gains in knowledge of the videorecorder and videocamera.

Three hypotheses were tested concerning the comparison of the two groups on psychomotor skills gained and the interaction between treatment used and learning styles. The hypotheses were tested with the two way analysis of variance (F Statistic). The hypothesis was

rejected indicating that there were significant differences between the treatment groups in psychomotor skills gained. No significant interaction was found between the treatment used and the learning style groups as far as psychomotor skills gained.

Conclusions

Based on the study conducted and the information collected and presented, it may be concluded that for the population group studied there was no significant difference in cognitive skills gained regardless of treatment. There was a difference in psychomotor skills gained depending on the treatment method used.

It may be further concluded that:

1. Students exhibiting symbolic learning styles gain cognitive skills equally well with either direct contact or abstract treatment.
2. Students exhibiting concrete learning styles gain cognitive skills equally well with either direct contact or abstract treatments.
3. Irregardless of learning style, students gain psychomotor skills significantly better when instructed with the direct contact method.
4. Irregardless of learning style, students gain psychomotor skills significantly less well when instructed with the abstract method.
5. Student reaction to the direct contact treatment was decidedly positive.

6. Student reaction to the abstract treatment was decidedly negative.

Recommendations

The findings of this particular study indicated that there was no significant difference in the amount of cognitive skills gained regardless of learning style or treatment. However, there was a significant difference in psychomotor skills gained depending on the treatment method used. Therefore, it is felt that the theory of learning style measurement and the subsequent teaching to measured learning style types is a valid theory. A larger test group or a group with more divergent learning styles could tend to further verify this theory. Greater utilization of this theory and related techniques needs to be applied at the classroom level. Classroom teachers need to be made aware of learning style measurement and evaluation techniques and assistance should be offered teachers in implementing such programs. Teachers should consider final skill goals before planning their instructional method and should utilize the treatment method that best facilitates the acquisition of these skills.

The results of the opinionnaire completed by the students during the study indicated that they preferred the direct contact type of instruction to the abstract approach. Because of this favorable response it would appear that student reaction should be measured, analyzed and utilized by teachers in their preparation of classroom instruction.

The following specific recommendations are made for further study:

1. A similar experiment could be conducted using a larger test group so that a broader range of learning styles could be obtained.
2. A similar experiment could be conducted utilizing non vocationally-technically oriented students.
3. A similar experiment could be conducted utilizing a test group that ranged mainly in the symbolic learning style.
4. Further research could be conducted to develop a more sensitive learning styles scale.
5. A similar study could be conducted with the addition of a psychomotor pre-test on the specific equipment.
6. A similar study could be conducted with the addition of a retention test of cognitive and psychomotor skills given some time after the post test.
7. A similar experiment could be conducted with junior or senior high school students.
8. A survey could be conducted to measure the correlation between learning styles and teaching methods as used in the classroom.
9. An experiment could be conducted to determine if students who possess a learning style reasonably balanced between concrete and symbolic learn best by a method of instruction that is a combination of direct contact and abstract activities.

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APPENDIX A

Learning Activities Opinionnaire
developed by John C. Banks

Learning Activities Opinionnaire

Directions: The statements below describe a variety of activities used to learn skills and knowledges. Read each statement. Respond to the statement on the basis of its value to you in a learning situation. React according to the following scale:

1 - Of No Value, 2 - Somewhat Valuable, 3 - Of Average Value,
4 - Very Valuable, 5 - Extremely Valuable

Place your answers on the answer sheet provided. Darken the space under the number that represents your response. Be sure to go across the answer sheet. There are no right or wrong statements - just the value to you in learning.

1.	Working with tools, equipment, apparatus and materials.	1 2 3 4 5
2.	Working and meeting with individuals or groups of people to learn new information and ideas.	1 2 3 4 5
3.	Activities involving the use of scale models, devices, and simulated situations. (Role playing, driver training simulator, games).	1 2 3 4 5
4.	Activities that teach job skills.	1 2 3 4 5
5.	Learning activities in which information and skills are presented by television, teacher or a classmate.	1 2 3 4 5
6.	Activities that allow me to immediately apply what I learn to actual problems I face.	1 2 3 4 5
7.	Learning experiences that only use verbal presentation to teach new information.	1 2 3 4 5
8.	Instruction using media (films, tapes, slides) to pictorially and graphically describe events, skills and procedures.	1 2 3 4 5
9.	Instruction dealing with formulas and symbols which describe the knowledges to be learned.	1 2 3 4 5
10.	Instruction based mainly on reading.	1 2 3 4 5
11.	Verbal instruction (written or oral) presented by a teacher with support of films, slides, and tapes.	1 2 3 4 5
12.	Classes where everything is set up allowing me no choice in determining goals or objectives.	1 2 3 4 5

13.	Teacher organized instruction where I have little influence on the type of instructional material and learning activities used.	1	2	3	4	5
14.	Class situations that lead me from simple to complex learning activities with pre-determined goals, objectives and sequence.	1	2	3	4	5
15.	Working alone but with constant teacher supervision and organization.	1	2	3	4	5
16.	Organized situations from simple to complex giving me a choice of where I want to start, stop or branch out to new experiences.	1	2	3	4	5
17.	Learning activities that have no pre-set goals, you just set your own and do what you want.	1	2	3	4	5
18.	Working alone and setting my own pace, determining my own goals and objectives.	1	2	3	4	5
19.	Courses that allow me to establish my own learning sequence and activities.	1	2	3	4	5
20.	Student designed, and directed instructional activities.	1	2	3	4	5
21.	Classes involving a minimum amount of organization.	1	2	3	4	5
22.	Instruction completely organized by me.	1	2	3	4	5

APPENDIX B

Videocorder/Videocamera Test

VIDEOCORDER/VIDEOCAMERA TEST

The purpose of this test is to evaluate instruction. You are being asked to respond to the statements initially as a pre-test of your knowledge of the subject. Upon completion of the instructional unit you will again be asked to respond to the statements as a post test of your knowledge of the subject.

It is possible that during the pre-test you may be able to answer only a few items. If you do not know the answer to an item, leave the item blank.

Once again, the purpose of the test is to evaluate instruction. There is no grade given. Please turn the page, read the instructions and begin.

VIDEOCORDER/VIDEOCAMERA TEST

Directions: To each statement listed below, select the response that most correctly answers the statement. Place your answer on the answer sheet provided. Darken the space under the number that represents your response. Be sure to go across the answer sheet. On True/False statements, mark #1 for True and #2 for False.

1. The tape speed of the videocorder is:
   (a) 3 3/4 ips.
   (b) 18 fps.
   (c) 7 1/2 ips.
   (d) 24 fps.

2. It is advisable to mount the camera on a camera stand (tripod or monopod):
   (a) when the camera is not in use.
   (b) when the operator wants complete mobility with the camera.
   (c) when the camera is to be operated in fixed or semi-fixed locations.
   (d) none of the above.
   (e) all of the above.

3. The function of the Camera Remote Control Trigger is:
   (a) to control tape motion when the camera is on a tripod.
   (b) to control tape motion when the camera is hand-held.
   (c) to control tape motion from the videocorder.
   (d) to control the zoom lens automatically.

4. The videocorder uses:
   (a) 16mm film.
   (b) 8mm film.
   (c) 35mm film.
   (d) all of the above.
   (e) none of the above.

5. The videocorder may be operated from:
   (a) a battery pack.
   (b) a car battery.
   (c) household power.
   (d) all of the above.
   (e) none of the above.

6. The tape recorded on the videocorder can be played back:
   (a) only on a video monitor.
   (b) only after the film has been developed.
   (c) on a 16mm projector.
   (d) immediately and seen on the camera viewfinder.

7. In order to protect the camera vidicon tube, the operator should:
   (a) pan the camera from side to side occasionally if the camera is pointed at a bright subject.
   (b) never point the camera directly at the sun or other sources of bright light.
   (c) avoid shooting scenes in very bright illumination with the lens wide open.
   (d) all of the above.
   (e) (a) and (b) above.

8. The microphone on the videocamera picks up sound:
   (a) equally well in all directions.
   (b) mostly from the front of the microphone.
   (c) equally well in front of and behind the microphone.
   (d) mostly from the sides of the microphone.

9. To connect the videocamera to the videocorder requires a:
   (a) cable with a 6-pin connector.
   (b) cable with a 10-pin connector.
   (c) cable with a 4-pin connector.
   (d) cable with a phono plug connector.

10. The function of the Remote Control Button is to control the:
   (a) tape motion when the camera is hand-held.
   (b) tape motion when the camera is on a tripod.
   (c) tape motion from the videocorder.
   (d) zoom lens automatically.

11. The function of the Tape Recording Lamp is to:
   (a) indicate that the battery power is low.
   (b) indicate that the camera is on.
   (c) indicate that the tape is running.
   (d) none of the above.

12. One way to monitor sound is to:
   (a) plug the earphone into the videocorder.
   (b) plug the earphone into the videocamera.
   (c) listen back through the microphone system.
   (d) you cannot monitor sound while recording.

13. The videocorder has stop-motion capabilities. T F

14. It is possible to record additional sound on the prerecorded tape during playback. T F

15. It is necessary to move the FUNCTION LEVER to STOP to shut off the recorder. T F

16. The videocorder is capable of recording programs off the air. T F

17. The audio and video recording levels on the videocamera and videocorder may be adjusted manually. T F

18. The videocorder is capable of playback on a conventional TV screen. T F

19. It is possible to record an image on videotape only once. T F

20. It is not possible to obtain a picture on the camera viewfinder unless you are actually recording on the videotape. T F

Match each of the following videocorder parts with its function:

21. Time Counter
22. Sound DUB knob
23. STILL knob
24. CAMERA/TV switch

(a) Selects signal source.

(b) Indicates recording time.

(c) Used in recording new sound on a prerecorded tape.

(d) Places picture in a stop-motion mode.

Match each of the following lens components with its function:

25. Lens Opening Ring
26. Focus Ring
27. Zoom Ring

(a) Moves subject closer or further away from screen.

(b) Allows precise adjustments for clear image.

(c) Controls amount of light entering lens.

APPENDIX C

Characteristic and Equipment Use Survey

CHARACTERISTIC AND EQUIPMENT
USE SURVEY

Directions: Do not write on the questionnaire. Indicate your response by choosing the letter corresponding to the answer that is best suited to you.

1. Your age:
   a. 17 - 19
   b. 20 - 22
   c. 23 - 25
   d. 25 - 30
   e. 30+

2. Your sex:
   a. Male
   b. Female

3. Your major:
   a. Industry and technology (Ind. Ed., Voc. Ed., Bus. Admin., Ind. Tech.)
   b. Home Ec. (Child Dev., Clothing, Early Child. Ed., Dietetics, Fashion Merch., Food Svc., H.E. in Bus., H.E. Ed., Hotel & Restaurant Management.)
   c. Liberal Studies (Math., Art, Art Ed., Marketing & D.E.)
   d. Education (Psychology, Voc. Rehab.)
   e. Other

4. Your class:
   a. Freshman
   b. Sophomore
   c. Junior
   d. Senior
   e. Graduate

For items 5 through 8, if you have not used the equipment mentioned, mark Column a on the answer sheet; if you have had moderate use of the equipment, mark Column c on the answer sheet; if you have had extensive use of the equipment, mark Column e on the answer sheet. Columns b and d are intermediate points on the scale.

5. How often have you used a videotape recorder?
   a. Not at all
   b. Occasional use
   c. Moderate use
   d. Frequent use
   e. Extensive use

6. How often have you used an audiotape recorder? (Either cassette or reel to reel)
   a. Not at all
   b. Occasional use
   c. Moderate use
   d. Frequent use
   e. Extensive use

7. How often have you used a videocamera?
   a. Not at all
   b. Occasional use
   c. Moderate use
   d. Frequent use
   e. Extensive use

8. How often have you used a single lens reflex (SLR) camera?
   a. Not at all
   b. Occasional use
   c. Moderate use
   d. Frequent use
   e. Extensive use

APPENDIX D

Equipment Test

EQUIPMENT TEST

1. IDENTIFY PARTS - CAMERA

_____ Remote Control Button
_____ Viewfinder
_____ Zoom Lens
_____ Recording Lamp
_____ Focus Ring
_____ Zoom Ring
_____ Lens Opening Ring

2. IDENTIFY PARTS - VIDEOCORDER

_____ Function Lever
_____ Earphone Jack
_____ Rotary Video Head
_____ Time Counter Reset Button
_____ Record Lever
_____ Camera Connector
_____ External Power IN Connector

3. OPERATION

_____ Thread recorder
_____ Set Time Counter
_____ Plug Camera Cable into Connector
_____ Place camera and videocorder in Standby mode
_____ Adjust lens
_____ Plug in Earphone
_____ Record (See script)
_____ Stop recorder
_____ Rewind to (000)
_____ Playback through viewfinder
_____ Obtain stop-motion
_____ Rewind tape

Assistant check off each item as completed.

_____
(Assistant name)

RECORDING SCRIPT FOR EQUIPMENT TEST

(Camera and VTR should now be in Standby Mode)

	Narrative
1. AIDE: ACROSS THE ROOM	1. Start recording me. Adjust the lens to maximum telephoto and shoot my head and shoulders. Adjust the lens to maximum wide-angle.
2. AIDE: GIVES INSTRUCTIONS, THEN WALKS TOWARD AND TO PERSON'S RIGHT AND STOPS.	2. I am going to walk toward you and to your right. Follow me with the camera. Adjust the lens to a medium shot.
3. AIDE: GIVES INSTRUCTIONS, THEN TURNS AROUND AND WALKS BACK TO ORIGINAL POSITION.	3. I am going to turn around and walk back to my original position. Follow me with the camera.
4. AIDE: STOPS, TURNS AROUND.	4. Stop recording.
5. AIDE CAN NOW MOVE TO PERSON TO CONTINUE CHECK-OFF.	5. Rewind the tape to (000) on the Time Counter.
	6. Place the earphone in the Earphone Jack.
	7. Play back 10 seconds of tape.
	8. Place the videocorder in STILL mode.
	9. Start the tape motion again and continue to the end of your program.
	10. Stop the tape. Rewind the tape.

APPENDIX E

Audiotape Narrative

AUDIOTAPE NARRATIVE

HELLO! THE PURPOSE OF THIS TAPE IS HELP YOU LEARN HOW TO USE THE SONY PORTABLE VIDEOCORDER AND VIDEOCAMERA. ALONG WITH THIS TAPE YOU HAVE BEEN GIVEN SOME HAND OUT SHEETS. THESE WILL GIVE YOU SOME BASIC INFORMATION AND INSTRUCTIONS AS WELL AS REINFORCING SOME OF THE INFORMATION ON THE TAPE.

FROM TIME TO TIME I WILL BE REFERRING TO THE INSTRUCTION SHEETS. WHEN I DO, LISTEN TO THE INSTRUCTIONS, STOP THE RECORDER, REFER TO THE INSTRUCTION SHEET, AND AFTER YOU HAVE COMPLETED THE REFERAL, TURN THE RECORDER BACK ON.

WHILE USING THE TAPE, PLEASE FEEL FREE TO REWIND AND PLAYBACK ANY PORTION OF THE TAPE YOU DON'T UNDERSTAND.

THE OBJECTIVES OF THIS LESSON ARE ON ONE OF THE HANDOUT SHEETS. WHEN ASKED TO STOP, STOP THE RECORDER, READ THE OBJECTIVES, THEN RESTART THE RECORDER. . .STOP!

THE SONY PORTABLE TELEVISION SYSTEM CONSISTS OF TWO COMPONENTS, THE CAMERA OR VIDEOCAMERA, AND THE RECORDER OR VIDEOCORDER. THE SYSTEM PROVIDES HIGH QUALITY VIDEO AND AUDIO RECORD/PLAYBACK FUNCTIONS IN A TRULY PORTABLE COMPACT UNIT. BOTH THE AUDIO AND VIDEO SIGNALS ARE RECORDED ONTO 1/2" VIDEOTAPE THAT TRAVELS AT A SPEED OF 7 1/2IPS (INCHES PER SECOND) OVER THE RECORDING SURFACES. THE TAPE CAN BE ERASED AND USED OVER AND OVER AGAIN.

THE RECORDED MATERIAL CAN BE IMMEDIATELY PLAYED BACK, HEARD, AND SEEN IN 3 WAYS, ON THE CAMERA VIEWFINDER SCREEN, ON A VIDEO MONITOR WITH A CONNECTING CABLE, OR ON CONVENTIONAL TV USING AN OPTIONAL RF UNIT.

THE RECORDING SYSTEM ADJUSTS AUDIO AND VIDEO RECORDING LEVELS AUTOMATICALLY TO ASSURE PERFECT RECORDING WITH VERY LITTLE EFFORT.

THE RECORDER HAS A SELF-CONTAINED BATTERY PACK THAT PROVIDES 45 MINUTES OF CONTINUOUS OPERATION WITH THE CAMERA. IF DESIRED, THE RECORDER MAY BE OPERATED FROM HOUSEHOLD POWER BY CONNECTING IT TO AN AC POWER ADAPTER, OR FROM A CAR BATTERY WITH THE USE OF AN OPTIONAL CAR BATTERY CORD.

ADDITIONAL SOUND, SUCH AS A COMMENTARY OR BACKGROUND MUSIC MAY BE RECORDED ON THE PRERECORDED PICTURING DURING PLAYBACK.

STOP-MOTION CAN ALSO BE OBTAINED FOR CLOSE EXAMINATION.

THE TIME COUNTER SHOWS THE RECORDING TIME MINUTE BY MINUTE AS WELL AS INDICATING THE AMOUNT OF TAPE, AS AN ORDINARY TAPE COUNTER. AUTOMATIC SHUT-OFF OCCURS WHEN THE TAPE RUNS OUT.

THE ELECTRONIC VIEWFINDER BUILT INTO THE CAMERA SHOWS YOU THE ACTUAL TV PICTURE THAT THE CAMERA PRODUCES.

THE SYSTEM CAN BE OPERATED BY REMOTE CONTROL BY PRESSING THE TRIGGER ON THE HAND GRIP TO START AND STOP THE TAPE.

THE MANUAL ZOOM LENS PERMITS YOU TO CHANGE FROM WIDE-ANGLE TO TELEPHOTO IN ONE CONTINUOUS MOTION.

THE BUILT-IN UNIDIRECTIONAL MICROPHONE PICKS UP THE SOUND FROM THE TELEVISED SUBJECT.

THERE ARE SOME PRECAUTIONS TO KEEP IN MIND WHEN HANDLING THIS TELEVISION SYSTEM. THESE PRECAUTIONS ARE LISTED ON ONE OF THE HANDOUT SHEETS. PLEASE REFER TO THE SHEET MARKED "PRECAUTIONS." (PAUSE)

REFER TO THE DRAWING MARKED "VIDEOCAMERA." (PAUSE) STARTING WITH THE UPPER RIGHT SIDE IS THE VIEWFINDER. THE VIEWFINDER IS WHAT YOU LOOK

AT TO MONITOR OR SEE THE PICTURE. INSIDE THE VIEWFINDER WINDOW, ON THE RIGHT, IS THE RECORDING LAMP. THE RECORDING LAMP LIGHTS UP WHEN THE TAPE IS RUNNING. OUTSIDE THE VIEWFINDER ON THE SURFACE OF THE CAMERA ARE THE EYEPIECE AND THE EYE CUP. THE RUBBER EYE CUP FITS OVER THE EYEPIECE. THE EYEPIECE AND EYE CUP ARE HINGED AND CAN BE LIFTED OUT OF THE WAY FOR MONITORING THE PICTURE DURING PLAYBACK.

ATTACHED TO THE BOTTOM OF THE CAMERA IS THE CAMERA CABLE. THE CONNECTOR OF THE CAMÉRA CABLE IS CONNECTED TO THE TAPE RECORDER. ALSO ALONG THE BOTTOM OF THE CAMERA IS THE GRIP. THE GRIP IS REMOVABLE SO THAT THE CAMERA CAN BE USED ON A MONOPOD OR TRIPOD. AT THE TOP OF THE GRIP IS THE LOCK SCREW. THE LOCK SCREW IS USED TO LOCK THE GRIP TO THE CAMERA.

ATTACHED TO THE FRONT SIDES OF THE GRIP ARE TWO LEGS. THESE LEGS SWING DOWN TOWARD THE FRONT OF THE CAMERA TO HELP HOLD THE CAMERA IN AN UPRIGHT POSITION DURING PLAYBACK OR WHEN THE CAMERA IS NOT IN USE. WHEN THE CAMERA IS IN USE, THE LEGS CAN BE SWUNG UP OUT OF THE WAY AND LOCKED BY THE CLIPS ON THE SIDE OF THE GRIP.

AT THE TOP, INSIDE OF THE GRIP IS THE REMOTE CONTROL TRIGGER. THE TRIGGER ACTIVATES THE TAPE MECHANISM IN THE VIDEOCORDER TO START THE RECORDING. ON THE FRONT OF THE CAMERA, IN THE LOWER RIGHT, IS THE REMOTE CONTROL BUTTON. THIS BUTTON ALSO ACTIVATES THE TAPE MECHANISM IN THE VIDEOCORDER TO START THE RECORDING BUT IS USED WHEN THE CAMERA IS IN PLACE ON A TRIPOD OR MONOPOD WITHOUT THE GRIP.

THE LENS ATTACHED TO THE FRONT OF THE CAMERA IS A ZOOM LENS AND HAS A RANGE FROM WIDE-ANGLE TO TELEPHOTO. THE LENS HAS 3 ADJUSTMENTS, THE LENS OPENING RING, THE KNARLED RING NEAREST THE CAMERA BODY, THAT CONTROLS

THE AMOUNT OF LIGHT ENTERING THE CAMERA; THE ZOOM RING, IN THE MIDDLE, THAT ALLOWS YOU TO MOVE THE SUBJECT CLOSER OR FURTHER AWAY ON THE SCREEN; AND THE FOCUS RING, AT THE FRONT OF THE LENS, THAT PERMITS PRECISE FOCUS ADJUSTMENTS.

ON THE FRONT OF THE CAMERA AT THE TOP IS THE MICROPHONE. THE MICROPHONE IS UNIDIRECTIONAL AND IT PICKS UP SOUND MOSTLY FROM THE FRONT OF THE MICROPHONE. THE SOUND FROM THE MICROPHONE CAN BE MONITORED OR HEARD BY CONNECTING THE EARPHONE TO THE VIDEOCORDER.

THAT COVERS THE LOCATION OF THE PARTS AND CONTROLS OF THE VIDEOCAMERA. THE FUNCTIONS OF MANY OF THE PARTS WILL BE DISCUSSED IN DETAIL LATER.

AS A MATTER OF REVIEW, KEEP THE FOLLOWING IN MIND:

1. THE VIEWFINDER CAN BE USED TO MONITOR THE PICTURE YOU ARE TAKING. ALSO, BY MOVING THE EYEPIECE UP OUT OF THE WAY, YOU CAN MONITOR THE PICTURE THROUGH THE VIEWFINDER DURING PLAYBACK.

2. THE RECORDING LAMP ON THE INSIDE OF THE VIEWFINDER WILL LIGHT UP WHEN THE TAPE IS RUNNING.

3. THE GRIP IS REMOVABLE SO THAT THE CAMERA MAY BE USED ON A MONOPOD OR A TRIPOD. IF YOU REMOVE THE GRIP, YOU ACTIVATE THE TAPE MECHANISM ON THE RECORDER BY PRESSING THE REMOTE CONTROL BUTTON.

4. THE LENS HAS 3 CONTROL RINGS, THE LENS OPENING RING THAT CONTROLS THE AMOUNT OF LIGHT ENTERING THE CAMERA, THE FOCUS RING THAT ALLOWS YOU TO FOCUS WHATEVER YOU SEE ON THE VIEWFINDER, AND THE ZOOM RING THAT WILL MOVE THE SUBJECT CLOSER OR FURTHER AWAY FROM THE SCREEN. A DRAWING OF THE ZOOM LENS IS ON ONE OF THE HANDOUT SHEETS.

5. THE MICROPHONE IS BUILT-IN AND IS UNIDIRECTIONAL, WHICH MEANS IT PICKS UP SOUND MOSTLY FROM THE FRONT OF THE MICROPHONE.

REFER TO OBJECTIVE #2. (PAUSE) IF THERE IS SOME DOUBT IN YOUR MIND AS TO THE LOCATION OF PARTS OR CONTROLS, REPLAY THAT PORTION OF THE TAPE.

THE OTHER COMPONENT PART OF THE PORTABLE TELEVISION SYSTEM IS THE VIDEOTAPE RECORDER. I WILL REFER TO IT AS THE RECORDER OR VIDEORECORDER THROUGHOUT THE TAPE.

REFER TO THE DRAWING MARKED "VIDEOCORDER #1." (PAUSE) THIS DRAWING SHOWS THE CONTROL PANEL AND THE BACKSIDE OF THE RECORDER.

STARTING WITH THE CONTROL PANEL, THE FUNCTION LEVER IS ON THE LEFT. THE FUNCTION LEVER ALLOWS YOU TO SELECT THE OPERATING MODE YOU WANT THE RECORDER IN. THE POSITIONS ARE MARKED ON THE PANEL: REW FOR REWIND, STOP FOR STOP, FWD FOR FORWARD, AND FF FOR FAST FORWARD, JUST LIKE ANY TAPE RECORDER.

TO THE RIGHT OF THE FUNCTION LEVER IS THE RECORD LEVER. PUSHING THE RECORD LEVER TO THE LEFT AND HOLDING IT THERE, AND AT THE SAME TIME PULLING THE FUNCTION LEVER TO FWD WILL PLACE THE RECORDER AND CAMERA IN THE RECORD AND STANDBY MODES. WHEN THE CAMERA IS IN STANDBY MODE, YOU CAN VIEW THE PICTURE OR SCENE WITHOUT ACTUALLY RECORDING.

TO THE LEFT OF THE CONTROL PANEL ARE THE RECEPTACLES FOR THE EARPHONE JACK AND THE MICROPHONE JACK. ALSO IN THIS ROW IS THE BATTERY METER WHICH INDICATES THE PRESENT CONDITION OF THE BATTERY.

ON THE BACK OF THE RECORDER ARE THE TRACKING CONTROL, THE CAMERA/TV SWITCH, THE CAMERA CONNECTOR, AND THE EXTERNAL POWER IN CONNECTOR. THE CAMERA/TV SWITCH PERMITS YOU TO SELECT THE SOURCE OF THE SIGNAL. YOUR SIGNAL COMES FROM EITHER A TV MONITOR OR A CAMERA. FOR THIS LESSON, SET

THE SWITCH ON CAMERA. THE CAMERA CABLE IS PLUGGED INTO THE CAMERA CONNECTOR ON THE BACK OF THE RECORDER. IF THE SOURCE OF POWER FOR THE SYSTEM COMES FROM OTHER THAN THE BATTERY, THEN THAT EXTERNAL POWER SOURCE IS PLUGGED INTO THE EXT POWER IN CONNECTOR. THE EXTERNAL POWER SOURCE CAN COME FROM EITHER REGULAR HOUSEHOLD AC POWER OR FROM A CAR BATTERY. IN EITHER CASE AN ADAPTER IS REQUIRED.

NOW LOOK AT THE DRAWING MARKED "VIDEOCORDER #2." (PAUSE) THIS DRAWING SHOWS THE TOP OF THE VIDEORECORDER.

THERE ARE TWO TAPE REELS, THE SUPPLY REEL WITH THE FULL TAPE ON IT AND THE TAKE-UP REEL. WITH THE CONTROL PANEL FACING YOU THE SUPPLY REEL IS ON THE LEFT. IT IS ALSO THE UPPER REEL.

THE RECORDER HAS AN AUTOMATIC SHUT-OFF SWITCH ALONG THE TAPE PATH. WHEN THE END OF THE TAPE PASSES THIS SWITCH, THE SWITCH POPS OUT AND THE SYSTEM AUTOMATICALLY SHUTS OFF. THE STILL KNOB IN THE LOWER RIGHT CORNER ON TOP STOPS THE MOTION OF THE TAPE WHEN PULLED DOWN, ALLOWING YOU TO VIEW A SELECTED SECTION OF THE TAPE FOR CLOSE EXAMINATION.

AFTER YOU HAVE RECORDED A TAPE AND ARE REPLAYING IT, YOU HAVE THE CAPABILITY TO ADD SOUND TO THE PRERECORDED TAPE BY USE OF THE SOUND DUB SWITCH AND A MICROPHONE.

THE ROTARY VIDEO HEAD IS UNDER THE LARGE ROUND COVER ON THE TOP, FRONT OF THE RECORDER. INSIDE THIS ARE THE PICTURE RECORDING HEADS (2 OF THEM). THEY ROTATE RAPIDLY MUCH LIKE AN AIRPLANE PROPELLOR ON A HUB, PLACING THE PICTURE SIGNAL ON THE TAPE SURFACE. THERE IS A GROOVE ALL THE WAY AROUND THE HEAD COVER THAT THE HEADS PROTRUDE OUT OF. DO NOT TOUCH THIS AREA EXCEPT TO CLEAN THE HEADS.

ON TOP OF THE ROTARY VIDEO HEAD COVER ARE THE TIME COUNTER AND THE TIME COUNTER RESET BUTTON. THE TIME COUNTER INDICATES THE AMOUNT OF TIME YOU HAVE RECORDED AND ALSO THE AMOUNT OF TAPE USED. THE RESET BUTTON ALLOWS YOU TO RESET THE COUNTER TO (000).

THOSE ARE THE MAJOR PARTS AND FUNCTIONS OF THE VIDEOCORDER. SOME PARTS WILL BE COVERED MORE SPECIFICALLY LATER.

NOW FOR A QUICK REVIEW. THE CAMERA/TV SWITCH SELECTS THE SIGNAL SOURCE; THE CAMERA CONNECTOR IS WHERE THE CAMERA CABLE CONNECTS INTO THE TAPE RECORDER; IF YOU ARE USING EXTERNAL POWER (OTHER THAN THE BATTERY), THAT POWER SOURCE IS PLUGGED INTO THE EXT POWER IN; THE FUNCTION LEVER PERMITS YOU TO SELECT THE OPERATING MODE, STOP, FORWARD, FAST FORWARD, OR REWIND; THE RECORD LEVER IS USED TO PUT THE RECORDER IN THE RECORD MODE; THE EARPHONE IS PLUGGED INTO THE EARPHONE JACK; THE TIME COUNTER INDICATES THE AMOUNT OF RECORDING TIME OR THE AMOUNT OF TAPE USED; THE COUNTER CAN BE RESET WITH THE RESET BUTTON; THE ROTARY VIDEO HEADS PLACE THE IMAGE ON THE TAPE; THE STILL KNOB STOPS THE MOTION OF THE TAPE; AND THE SOUND DUB KNOB ALLOWS YOU TO PLACE SOUND ON A PRECORDED TAPE DURING PLAYBACK.

LOOK BACK AT OBJECTIVE #1 (PAUSE). IF YOU FEEL YOU HAVE REACHED THIS OBJECTIVE, CONTINUE ON WITH THE TAPE. IF YOU HAVE SOME DOUBTS, REPLAY THE PORTION OF THE TAPE TO REINFORCE YOUR LEARNING.

IT MIGHT BE EASIER FOR YOU TO UNDERSTAND HOW TO THREAD THE RECORDER IF YOU UNDERSTAND THE REASON FOR THE TAPE PATH. ASSUME YOU ARE RECORDING. FIRST THE TAPE PASSES OVER THE ERASING HEAD. THIS WAY EVERYTHING THAT WAS PREVIOUSLY RECORDED ON THE TAPE IS ERASED. VIDEOTAPE CAN BE USED OVER AND OVER. NEXT THE TAPE PASSES AROUND THE LARGE ROTARY VIDEO HEAD. HERE THE PICTURE IMAGE IS ELECTRONICALLY PLACED ON THE TAPE. FINALLY THE TAPE

PASSES THE AUDIO OR SOUND HEAD AND SOUND IS PLACED ON THE TAPE. THE TAPE THEN GOES ONTO THE TAKE-UP REEL. THE PATH IS THE SAME DURING PLAY-BACK BUT THE RECORD BUTTON IS NOT DOWN AND THEREFORE THE ERASING HEAD IS NOT ACTIVATED.

THE TAPE PATH IS ETCHED IN WHITE ARROWS ON THE TOP OF THE RECORDER. FIRST THE FUNCTION LEVER SHOULD BE AT STOP. PLACE AN EMPTY REEL ON THE TAKE-UP REEL SPINDLE. THIS IS THE LOWER SPINDLE. TURN THE REEL AROUND, APPLYING A LITTLE PRESSURE ON TOP UNTIL THE REEL DROPS DOWN AND CLICKS INTO PLACE ON THE SPINDLE. PLACE A FULL REEL ON THE SUPPLY REEL SPINDLE. THIS IS THE UPPER OR LEFT SPINDLE. LOCK THE REEL IN PLACE AS YOU DID THE TAKE-UP REEL. THE TAPE COMES OFF THE SUPPLY REEL AND ONTO THE TAKE-UP REEL IN A COUNTER-CLOCKWISE DIRECTION.

NOW UNWIND ABOUT 2 FEET OF TAPE AND THREAD IT INTO THE TAKE-UP REEL ACCORDING TO THE DIRECTION OF THE ARROWS. TURN THE TAKE-UP REEL BY HAND TO TAKE UP ANY EXCESS SLACK IN THE TAPE PATH.

NOW YOU ARE READY TO CONNECT THE CAMERA CABLE TO THE RECORDER AND RECORD. INSERT THE CAMERA CABLE OF THE CAMERA INTO THE CAMERA CONNECTOR OF THE RECORDER. TO DO THIS PLUG THE 10-PIN CONNECTOR INTO THE CAMERA CONNECTOR ON THE RECORDER BY MATCHING THE SLOT IN THE PLUG WITH THE GUIDE PIN ON THE TOP OF THE RECEPTACLE. TURN THE LOCKING COLLAR OF THE CABLE CLOCKWISE UNTIL THE CABLE LOCKS FIRMLY INTO PLACE.

SET THE CAMERA/TV SWITCH TO CAMERA. PRESS THE TIME COUNTER RESET BUTTON TO SET THE TIME COUNTER TO (000). THIS COUNTER INDICATES RECORDING TIME AS WELL AS THE AMOUNT OF TAPE USED.

TO RECORD, FIRST SET THE RECORD LEVER TO THE RECORD POSITION AND THEN

THE FUNCTION LEVER TO FWD (BEFORE RELEASING THE RECORD LEVER). THE RECORD LEVER WILL LOCK INTO PLACE AND THE VIDEOCORDER AND CAMERA WILL REMAIN IN THE STANDBY MODE.

ADJUST THE CAMERA LENS TO OBTAIN A SATISFACTORY PICTURE AS DISPLAYED ON THE VIEWFINDER. THE AUTOMATIC CONTROL OF THE CAMERA PERMITS OPERATION OVER A WIDE RANGE OF LIGHTING CONDITIONS. IN MOST CASES THE LENS SHOULD BE SIDE OPEN. HOWEVER, BY SETTING THE OPTIMUM LENS OPENING TO SUIT LIGHTING CONDITIONS, BEST PICTURE QUALITY WILL BE ASSURED. PRECISE ADJUSTMENTS FOR LIGHTING AND FOCUS SHOULD BE PERFORMED BY WATCHING THE VIEWFINDER SCREEN. FOR ZOOM, SET YOUR STAGE FOR A WIDE-ANGLE SHOT, THEN CLOSE UP ON THE POINT OF INTEREST. TRY ALL THE LENS ADJUSTMENTS A FEW TIMES UNTIL YOU BECOME FAMILIAR WITH HOW EACH OPERATES.

TO START THE RECORDING, PRESS THE GRIP SWITCH ON THE HAND GRIP OF THE CAMERA OR PUSH THE START BUTTON AT THE RIGHT SIDE OF THE LENS MOUNT. YOU MAY NOW RELEASE THE TRIGGER OR BUTTON AND THE SYSTEM WILL CONTINUE TO OPERATE.

TO MONITOR THE SOUND, PLUG THE EARPHONE INTO THE EARPHONE JACK ON THE CONTROL PANEL OF THE RECORDER. PICTURE AND SOUND LEVELS ARE AUTOMATICALLY ADJUSTED BY THE RECORDING SYSTEMS IN THE RECORDER AND CAMERA.

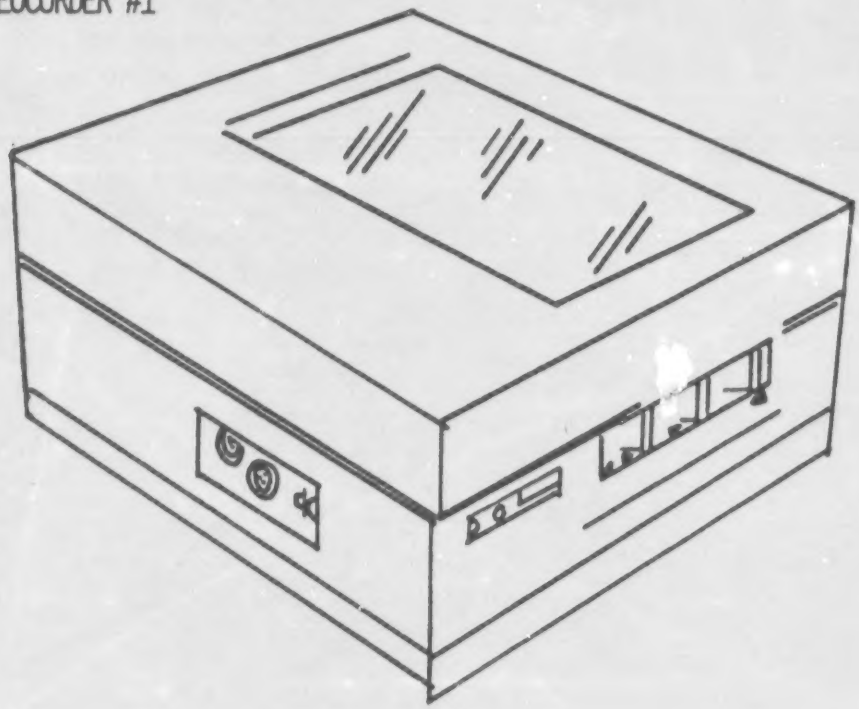
TO STOP THE RECORDING, PRESS THE GRIP SWITCH ON THE HAND GRIP OR THE START BUTTON AGAIN. AT THE END OF THE RECORDING, SET THE FUNCTION LEVER TO STOP. SWING THE TWO LEGS ON THE CAMERA GRIP DOWN AND FORWARD SO THE CAMERA WILL STAND UPRIGHT. LIFT THE EYEPIECE UP SO YOU CAN SEE THE VIEWFINDER SCREEN EASILY. SET THE FUNCTION LEVER TO FWD.

A STOP-MOTION PICTURE IS OBTAINED BY PULLING THE STILL KNOB DOWN IN

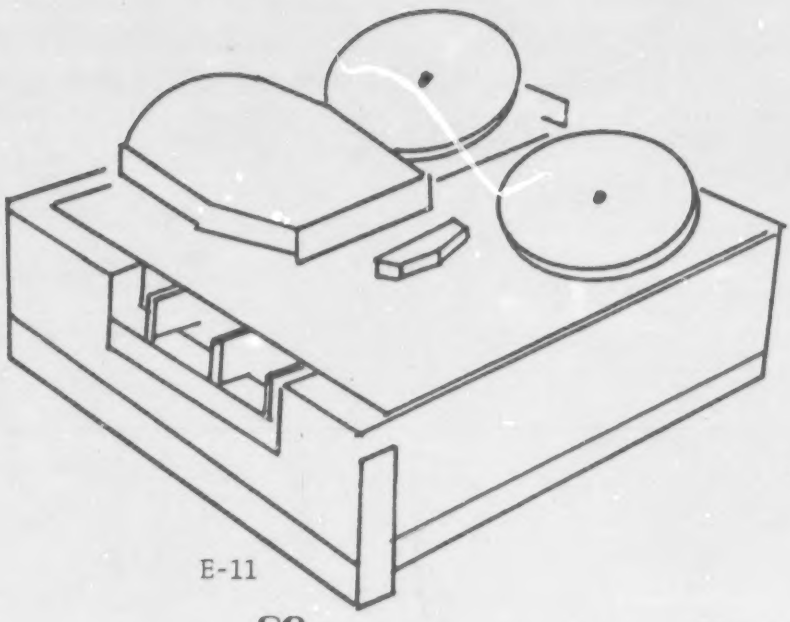
THE DIRECTION OF THE ARROW. TO RELEASE THE STILL MODE, RETURN THE KNOB TO ITS NORMAL POSITION.

THAT'S IT! NOW TAKE TIME TO REVIEW ANY PARTS OF THE TAPE OR DRAWINGS TO REINFORCE YOUR THINKING AND LEARNING. WHEN YOU HAVE FINISHED, ASK AN AIDE FOR FURTHER DIRECTIONS.

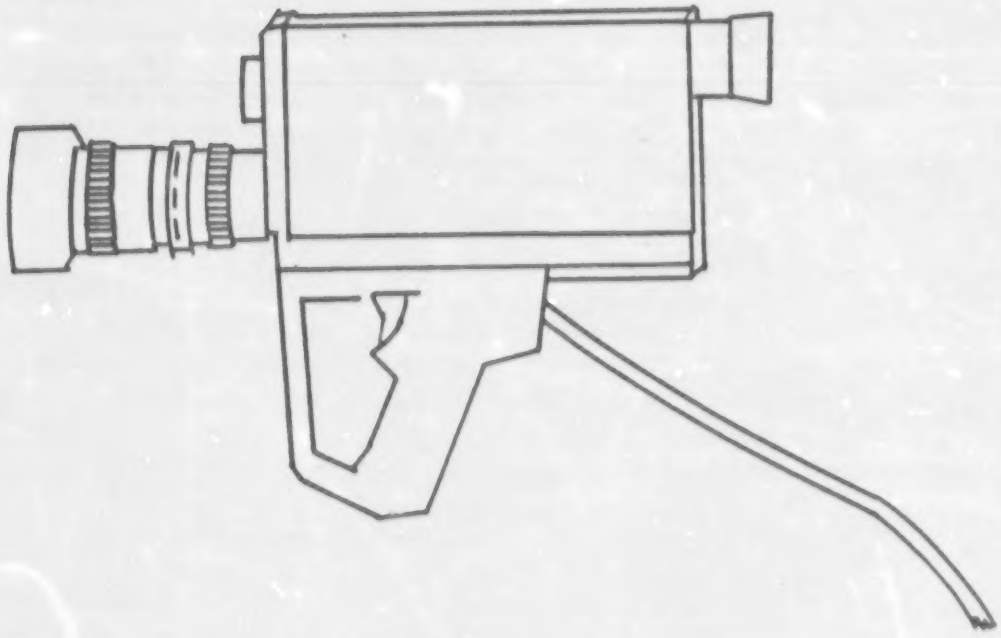
VIDEOCORDER #1



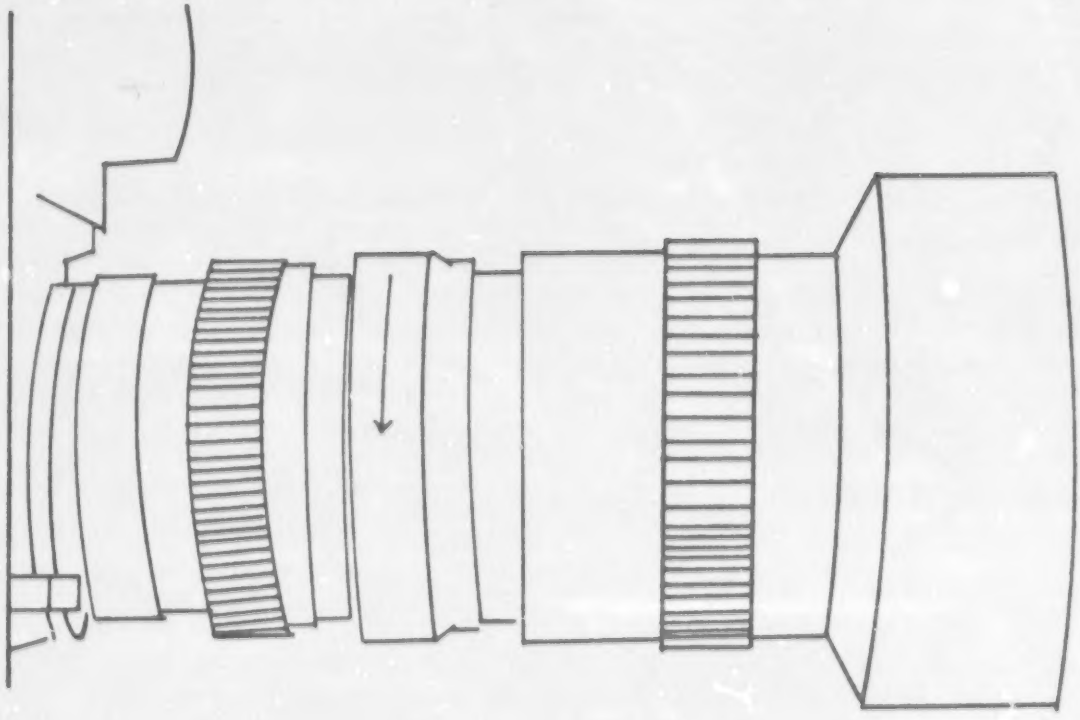
VIDEOCORDER #2



VIDEOCAMERA



ZOOM LENS



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APPENDIX F

Group I Data Table

GROUP I DATA TABLE

Student #	Treatment Used	LAQ Test Score	V/V Pre-Test Score	V/V Post Test Score	Equipment Use Test Score
05	I	42	08	22	26
06	I	40	06	20	24
08	I	44	15	20	25
24	I	39	18	25	25
30	I	39	06	20	21
33	I	43	10	22	20
07	II	40	16	23	25
13	II	44	15	26	26
15	II	40	07	22	16
16	II	40	01	22	17
35	II	41	17	18	23
37	II	42	04	12	16

LAQ = Learning Activities Questionnaire
V/V = Videocorder/Videocamera

APPENDIX G

Group II Data Table

GROUP II DATA TABLE

Student #	Treatment Used	LAQ Test Score	V/V Pre-Test Score	V/V Post Test Score	Equipment Use Test Score
01	I	38	12	23	24
03	I	36	11	22	26
04	I	37	12	21	24
12	I	35	18	24	25
19	I	38	11	23	25
42	I	35	06	22	23
22	II	38	11	23	23
23	II	38	09	26	08
29	II	33	07	16	20
31	II	34	04	22	23
34	II	35	13	20	22
39	II	36	01	21	23

LAQ = Learning Activities Questionnaire
V/V = Videocorder/Videocamera